INTRUSION OF A RHESUS *MACACA MULATTA* PAIR INTO A LANGUR *PRESBYTIS ENTELLUS* GROUP[1]

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In the course of 3400 hours of field observation on free ranging langur *Presbytis entellus* in Jaipur, India, during 1985 and 1986, six cases of rhesus *Macaca mulatta* associating (as residents) with langur groups were observed in the thirty censused groups. One of these associations involved an adult rhesus pair and a unimale bisexual langur group which was extensively studied at the Ambagarh reserve forest. This report presents data on their interaction during the initial seven months of the rhesus residency in the langur group. Most of the interactions involved langur adult females with infants and the male rhesus. The female rhesus seldom interacted with the langur individuals. A possible fitness enhancing strategy is suspected behind the social isolation of the rhesus from its conspecifics.

(With two text–figures)

INTRODUCTION

Polyspecific association in non–human primates has been reported from a number of study sites (Bernstein 1967, Gartlan & Struhsaker 1972, Freeland 1977, Rudran 1978, Das and Sharma 1979, Waser 1980). Most of these associations are temporary and occur due to overlapping activity ranges. However, a few cases of long term intertaxa association have also been reported (Bernstein 1967, Dolhinow 1972, Das and Sharma 1980, Mohnot 1984).

This study examines the interaction between rhesus and various age and sex classes of the Hanuman langur *Presbytis entellus* after the forceful intrusion of the former into a unimale bisexual langur group designated as G–3. This type of association between rhesus and langur has been observed in as many as six groups (four unimale, one multimale and one all male band) out of the thirty censused langur groups in Jaipur. Each of the groups excluding G–3, had an adult rhesus male resident. The pair with G–3 gave birth to an infant later. Association of one or more langurs with rhesus groups was not encountered.

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STUDY AREA AND METHODS

The study area was the Ambagarh reserve forest situated on the eastern border of the city of Jaipur, Rajasthan, India. The vegetation is of dry deciduous type dominated by *Anogeissus pendula, Maytenus emarginata, Holoptelea integrifolia* and a number of *Acacia* species. Rainfall averages 600 mm per annum and is strongly seasonal, with almost all rain falling during the month of July and August. Winter (November to February) temperatures vary between 6°–15°C, while the summer (April to June) temperatures may reach as high as 47°C.

Seven groups (five bisexual, two all male) of langurs inhabit this area . Extensive observations were made on a unimale bisexual group (G–3), which had a resident rhesus pair.

Data on interactions between the rhesus pair and the langur group G–3 was collected systematically during the ten days of each month while scan sampling G–3 for its activity pattern and feeding ecology. Sampling all occurrences of some behaviour was the method of choice (Altman 1974) for recording interaction between rhesus pair and langurs.

RESULTS

Rhesus–langur infant interaction: The rhesus

pair was never observed in direct aggression or any other form of interactive action towards langur infants. The infants who wandered away from their mothers in the course of exploration hurried back to them when the rhesus got near while passing by or while relocating himself or herself within the group.

Rhesus–langur juvenile interaction: Small juvenile langurs who had just been weaned, avoided any form of interaction with the rhesus. They never indulged in instigations or challenged the dominant attitude of the intruders and readily moved away from preferred areas on approach of the rhesus. Avoidance in this case demonstrated a condition of fear, and submission of the small juveniles towards the aggressive rhesus.

All the langur juveniles in the study group were females. Rhesus–langur juvenile interaction constituted 19.5% of the total recorded interactions (Fig. 1), with a mean frequency of 6.3 encounters per day in December, followed by a significant fall (2.1, 2.3, 1.0, 2.1 and 2.8 encounters per day respectively; Fig. 2) in the following five months. A second peak of 4.1 encounters per day was recorded in June.

The behavioural repertoire of the large langur juveniles during an encounter was attention attracting: large juveniles would approach the rhesus within 5–10 m and start squealing. The duration of the squeal varied from as short as 2 sec to about 20 sec. The rhesus male generally ignored the squealers; however, if the squealing persisted he would threaten or even chase the stentorian. The female rhesus seemed less tolerant than the rhesus male and was always observed to threaten and even chase the large juveniles. The male and female rhesus threats involved: (1) the tense mouth face; (2) the startling open mouth face. Chasing, which seldom occurred, varied over dis-

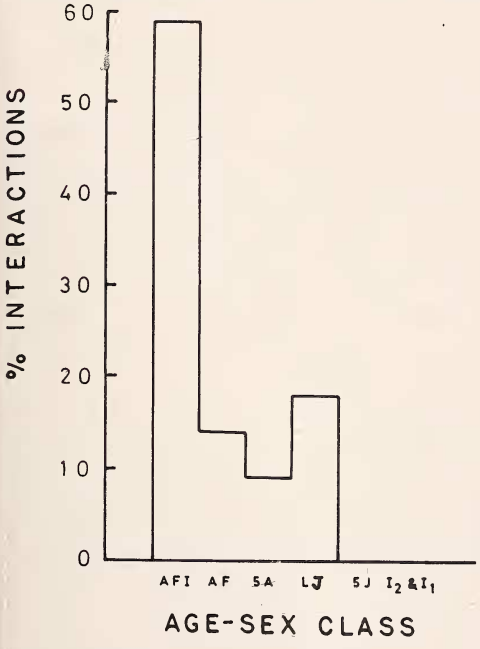

Fig. 1. Percent interaction of various age-sex classes of langurs with rhesus (December 1985 to June 1986). AFI: adult female with infant; AF: adult female; SA: subadult female (in this group there were no subadult males); LJ: large juvenile; SJ: small juvenile; I-2: infant 2(big infant) I-1: infant 1 (small black coat infant).

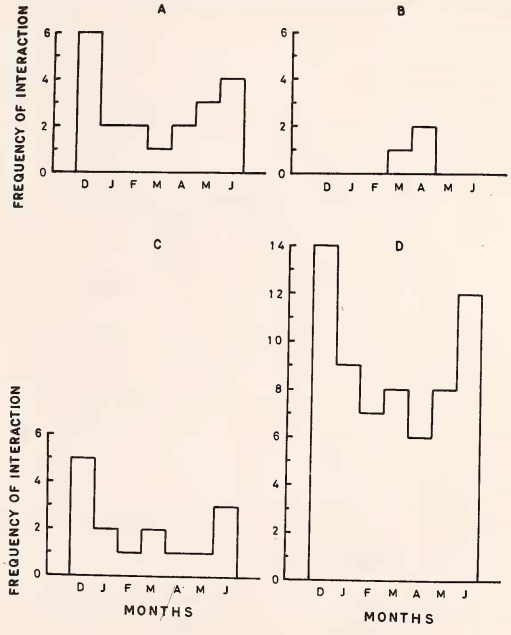

Fig. 2. Frequency of interactions (per day) between various age-sex classes of langurs and rhesus (December 1985 to June 1986). A: rhesus-langur large juvenile; B: rhesus-langur subadult female; C: rhesus-langur adult female; D: rhesus-langur adult female with infant.

tance of 5–50 m. Adult langur females would intervene during a chase in an attempt to defend the langur juveniles; intervention involved collective rushing by one or more individual at the rhesus. This usually terminated the chase.

Rhesus–langur subadult interaction: Subadult langur females were docile and unlike the juveniles, did not incite the rhesus. Interaction between the rhesus and langur sub–adults was rare, constituting only 2.6% of the total recorded data (Fig. 1). March and April were the only two months when interactions were seen to occur. Interactions are represented by 1.1 and 1.7 encounters per day respectively (Fig. 2). All interactions between the two occurred when subadult females tried soliciting extra–troop males or the new resident male during and immediately after male replacement (take over) in the unimale bisexual group G–3. Interaction involved threats and chase directed by the rhesus male towards the langur sub–adults. The chase in this case occurred over distances of 30 to 150 metres. Here too, adult langur females came to the rescue of the subadults in the same manner as described earlier. The female rhesus was never observed interacting with this class of langurs.

Rhesus–langur adult female interaction: The behavioural pattern of adult females (AF) and adult females with infants (AFI) towards the rhesus was quite distinctive. AFI avoided the presence of the rhesus pair. This was revealed by their circumspect, albeit wary, attitude. This class constituted the maximum number of the total recorded interactions between the rhesus and the langurs (61.7%; Fig. 1). December and July show a higher frequency of interaction. However, there is no significant difference between the frequency of encounters per day over the remaining seven consecutive months (Fig. 2).

The behaviour during an interaction between the rhesus male and AFI was characteristic and involved the following sequence: AFI moved towards the rhesus male, squealing, stopped a few metres in front of him, turned the infant upside down many times, nuzzled the infant, held its tail in her mouth, and then took off squealing and screaming. In some cases this act was performed without any vocalization.

This formed the most predominant behavioural activity of this class of langurs towards the rhesus male. However, it would be wrong to generalize this behaviour to all AFI. Factors such as the age of the adult female and the age of the infant seemed to play an important role in determining the probability of interaction. Adult females with new born infants never approached the rhesus male or rhesus female. The frequency of interaction between the rhesus and AFI also depended on the spatial distribution of the rhesus within the langur group. The rhesus occupied strategic locations such as a preferred resting site (the rhesus generally sat at the base of the tree or at the junction between the trunk and the first whorl of branches, thus preventing the langurs from moving into and out of the tree), preferred feeding site, a water hole, or remained seated in the path of group progression. Interaction between the rhesus and adult females without infants seldom occurred and did not involve the complex behavioural pattern mentioned above. All interactions which occurred did so over provisioned food or when the rhesus got in close proximity of the adult females. Interaction between the two involved threat gestures, chase and even a total indifference by the rhesus male towards the inciting AF. Many times the langur females emitted an *Ahhh* sound (produced by the forceful expulsion of air from the throat with the mouth remaining closed or partly open) directed towards the rhesus.

Rhesus–langur adult male interaction: Most interactions between the rhesus and langur adult males took place immediately after a take—over (change of adult male in a unimale bisexual langur group), with the rhesus male being the agressor in all recorded cases. Individual idiosyncrasies of the langur adult males played an important part in ascertaining the nature and intensity of the aggression directed towards them by the rhesus male. The degree of opposition faced by the aggressive langur male, from the rhesus male, was commensurable to the aggression directed by them towards G–3 individuals.

During and after a takeover the rhesus male threatened and chased the usurper male whenever he attacked or attempted to attack adult females with infants. One langur male "MB", who took over group G–3 twice, did not direct aggression towards AFI or infants. This male was readily accepted by the rhesus and G–3 individuals. Male "XT" was the most violent of the five males who had taken over G–3 from 24 December 1985 to 16 May 1986. Male "XT", unlike males "CZ", "SE", "BF" and "Stumpy" did not face any opposition from the rhesus male. Male "CZ" who came next in the hierarchy of "New male–AFI aggression" faced maximum aggression by the rhesus male. Over a period of seven days, 24 instances of rhesus male–"CZ" interactions were recorded. All recorded cases were agonistic encounters and in relation to "New male – AFI aggression". On all 24 occassions "CZ" yielded to rhesus dominance with only three (12.2%) cases of retaliation.

Unlike the rhesus male, the rhesus female did not intervene during "New male – AFI interactions" and very seldom interacted with the langur male. All recorded interactions between the two took place over provisioned food, with the rhesus female being the agressor, but unable to displace the adult langur male. During such interactions the rhesus male was observed threatening and even chasing the adult male langur.

Discussion

In the present investigation interaction between the rhesus and the langurs showed two peaks (December 1985 and June 1986; Fig. 2). The initial peak in December 1985 was due to the recent entry of the rhesus pair into the study group. The scarcity of trees with sufficient foliage to provide shelter from the high temperature (42°–47°C) during June, thus resulting in competition for shelter sites, accounted for the sudden rise in encounters during that month.

Polyspecific association in primates has usually been looked at from the point of functional advantage to one or both species. One of the most prominent of these advantages is antipredatory: an animal increases the probability of detecting a predator, and thus escapes (Gartland and Struhsaker 1972, Rudran 1978).

The potential predators at the Ambagarh reserve forest are hyaenas *Hyaena hyaena*, jackals *Canis aureus* and feral dogs *Canis familiaris*. Only one instance each of direct interaction with hyaenas and jackals was observed during the study period; but on a number of occasions potential predators were seen lurking within the activity range of the langur group. Langur interactions with known dogs were peaceful and the former were often observed picking out ticks from the latter, but with unknown dogs the interactions were always aggressive. A peaceful type of association between the dogs and the rhesus pair did not exist. Apparently association among these two species had no antipredatory advantage to the individuals of G–3, who live in a very large group of 117 individuals. The rhesus pair probably benefited from an increased probability of detecting predators in an area where hyaenas and jackals live.

During a takeover in G–3 the rhesus male chased langur females indulging in sexual solicitation of extra—troop males. It would probably be absurd to attribute this behaviour to dominance exhibition by the rhesus male, but this act most certainly had a detrimental effect on the acceptance of the rhesus pair by G–3 individuals.

The behaviour of adult females with infants towards the rhesus male was characteristic, and is accountable if looked at from the point of female anticipation of possible threat to the survival of offspring due to the presence of unknown intruders. "Unknown", in this case refers to the unfamiliar and unknown intentions of the strangers. This was substantiated by the non—exhibition of this behaviour by AFI one year after the intrusion.

The exhibition of aggression by the rhesus male towards adult langur males attacking AFI was perhaps an affectation, a strategy to inculcate acceptance by the female langurs who form the stable core of langur social organization.

Why the rhesus male left his group probably

has reasons. Leaving is a functional response to increased population density; during splitting of groups in Japanese macaques animals who leave presumably gain advantages in terms of food availability, decreased breeding disturbance and reduced susceptibility to diseases (Furuya 1968, 1969, 1973). In some groups, individuals leave as a result of aggression directed at them by dominant male members of the group (Poirier 1969), to avoid inbreeding (Itani 1972), or to prevent depression of fitness (Hill 1974). In the present study the rhesus male left his natal group with a female. It is assumed that the fitness of the rhesus male must have been greatly reduced due to prevention of access to receptive females by dominant males. Hence, departure from conspecifics and taking along an adult female could possibly be a fitness enhancing strategy. Reproductive advantage due to isolation has been reported by Barash (1975) in Hoary Marmot which exhibits two distinct social systems: isolated family units and populous colonies. The male in the isolated family need not fear encroachment of competing males on his sexual prerogatives; social isolation is thus used as a fitness enhancing strategy. To say anything with certainty for rhesus regarding fitness enhancing strategy, long term empirical evidences for comparison are needed on the reproductive success of subordinate rhesus male living in his natal group. If social isolation could enhance the fitness of subordinate rhesus individuals, then why is it not that most, if not all, subordinate rhesus males leave their natal group? Only further investigation of the subject can answer this question.

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